

# NON INVASIVE GLUCOMETER (IR LED MODULE (TCRT 5000))

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**Abstract** - Diabetes is considered as one of the major donors to accelerate sickness in passing non-contagious diseases. The number of diabetic cases increased to 108 million in 2014. Prevalence of being diabetic has increased more rapidly developing countries. Between 2000 and 2016, early mortality from diabetes increased by 5%. In 2019, diabetes is the ninth leading cause of death, with an estimated 1.5 million people directly associated with diabetes. Prevailing strategy for assurance of blood glucose concentration is by employing a self-monitoring glucose meter. Non-invasive glucose monitoring alludes to the estimation of blood glucose levels without drawing blood, puncturing the skin, or causing torment or injury. The proposed system has modelled a tool non-invasive blood glucometer monitoring using TCRT 5000 module.

**Key Words:** Diabetes, Glucose, Monitoring, Non-invasive, Health, Sensor.

## 1. INTRODUCTION

To provide exact, commercial, and continuous glucose monitoring, we've unfold an extraordinary one-use saliva nano-biosensor. [1] Peer advances with reference to non-invasive, and continuous glucose monitoring gadgets with a remoted straight forward positioned on monitoring glucose levels in alternative physiological fluids which return blood. [2] Optical coherence tomography has been used to non-invasively monitor the blood glucose concentration in healthy subjects with high accuracy and bearable specificity. [3] Diabetes management requires accurate and reliable blood glucose monitoring. This hand out many provocations, including poor patient observation. Tear glucose measurement is an alternative to traditional fingertip tests for tracking blood glucose levels, but measuring glucose in tears has not yet been achieved. [4] The consequences confirmed that the suggest correlation coefficient (Rp) among the anticipated and reference blood glucose levels of all of the examined topics reached 0.85 and the usual standard error of prediction (SEP) was 7.70 mg/DL. rice field [5] The proposed method is a non-invasive glucose meter with an IRLED module. To appraise the exactness and validity of a new modern prototype non-invasive glucose meter over an ease variety of serum glucose concentrations. Current issues with brilliantly wellbeing care frameworks incorporate quick glycemetic determination and standard

monitoring. In the context of medical smart healthcare with medical things, IOMT is considered a particular, IOMT is seen as a special paradigm for the Internet of Things (IoT). A portable non-invasive glucose meter that assists IOM suggest great potential to ease rapid monitoring and connection with endocrinologists in rural areas where diagnostic centers and hospitals are not readily available growth. Patients can enumerate their blood glucose without pricking their fingers and sync it to the cloud so that a nearby endocrinologist can monitor their blood glucose. Information for each understanding. The drug is also administered by an endocrinologist to a remote patient prior to treatment.

## 2. METHODOLOGY

Non-invasive blood glucose monitoring meter using TCRT 5000 is designed in such a way that it provides needle free glucose monitoring. There will be no finger pricking. The normal blood glucose level of before food value varies from 70-130 mg/dL and after food blood glucose value ranges below 180 mg/dL. Non-invasive blood glucose glucometer with sensors that monitor displayed. Simply, proceed with neat hand and now place the fingertip on the sensor and wait for 5 to 15 seconds to see the blood glucose level, it will be shown on the display clearly. And here the home monitoring will be replaced by NIR (Near-Infrared spectroscopy) in which the unknown substance is illuminated with a broad-spectrum of near infrared light, which can be absorbed, transmitted, reflected or scattered by the sample of interest. The illumination is typically in the wavelength range of 0.8 to 2.5 microns. The process is painless and also very convenient. Methods to measure glucose levels in different physiological fluids are being developed by a number of corporations.

### 2.1 BLOCK DIAGRAM

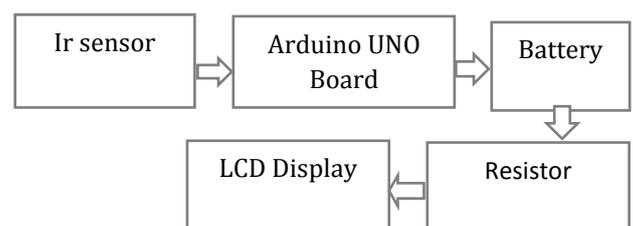


FIG 1: Block Diagram

### 3.HARDWARE AND SOFTWARE IMPLEMENTATION

Hardware:

- Arduino Uno
- TCRT 5000 SSensor
- 9V Battery
- Connecting Wires
- Variable Resistor
- LCD Display
- USB Cable
- Switch

Software:

- Embedded C
- Arduino IDE coding

#### 3.1 Arduino UNO

Arduino Uno is a microcontroller board found on ATmega328. It has 6 analog inputs, a 16MHz crystal oscillator, an auxiliary device, a power jack, an ICSP header, and a corrected button. It accommodates everything be in need of support the microcontroller; merely associate it to a computer with a USB cable or power, it with a AC-to-DC adapter or battery to get start off. The Uno diverge from all foregoing boards in that it does not use the FTDI USB-to-serial driver chip. Alternatively, it attributes the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and was named to designate the next Arduino 1.0 release. Uno and version 1.0 will be the testimonial version of the evolving Arduino. Uno is the fresh outcome on the USB Arduino board, and is the resource prototype for the Arduino platform.



FIG 2: Arduino UNO

#### 3.2 TCRT5000 SENSOR

FEATURES

- Available in major packages
- The type of detector used is a photo-transistor with a peak detection distance of 2.5mm
- Operating voltage is 5V
- Emitter wavelength is 950nm

### APPLICATION

- Used in IR sensor module
- Used for obstacle avoidance / detection
- Utilized to calculate the interval of an object or target.

The TCRT5000 IR sensor usually be made of an IR-Tx (transmitter) & and IR-Rx (receiver). Here, the transmitter and receiver are photodiodes and phototransistors. Sends and receives IR signals as soon as these signals pass through the entity, the IR receiver receives the signals. Here, the transmitter behaves like a transistor, except that the base terminal is excited by light. The TCRT5000 IR sensor package includes the coupled photodiode and phototransistor in one package. The photodiode (Tx) of this sensor contains two pins, an anode and a cathode, which are mainly used to generate infrared signals. Comparably, the phototransistor of this sensor carry two pins like an emitter and a collector. These pins participate in a dominant function in analyzing the contemplated infrared signal.

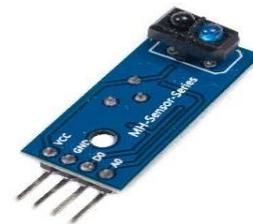


FIG 3: TCRT5000 Sensor

#### 3.3 9V BATTERY

The 9-volt battery, is an electric powered battery that lets in a nominal voltage of 9V, literally 7.2-9.6v, relying at the self-regulating. Batteries of numerous dimensions and measurements are put together. A genuinely familiar measure is known as PP3 and was hand over in initial transistor radios. The PP3 has a rectangular prism shape with rounded edges and has two snap-polarized connectors on the top. This type is generally used in many implementations, as well as household applications likely smoke and gas revealers, clocks, and miniatures.



FIG 4: 9V Battery

### 3.4 CONNECTING WIRES

Connecting wires concedes an electrical cutting-edge to hold from one factor on a circuit to some other considering energy calls for a middleman via which it may progress. Most of the connecting wires are manufactured by copper or aluminium. They own trivial resistance to the motion of cutting-edge.



**FIG 5: Connecting Wires**

### 3.5 VARIABLE RESISTOR

A variable resistor is a resistor of which the electric resistance esteem can be calibrated. A variable resistor is an electro-mechanical transducer and conventionally operates by sliding an exposure (wiper) across a resistive element usually, a fine film or chunk of carbon or a resistive wire build of nickel chromium or tungsten composite. A variable resistor is worn in numerous dimmer switches and quantity controls.



**FIG 6: VARIABLE RESISTOR**

### 3.6 LCD DISPLAY

A liquid crystal show (LCD) is a digital tool this is molded right into a small, monotonous panel fabricated from any colour wide variety or monochrome pixels filled with liquid crystals and embellished earlier than a mild supply (backlight) or show. It is commonly used in battery-powered appliances because it uses very small amounts of electricity.



**FIG 7: Lcd Display**

### 3.7 USB CABLE

It is utilized to put through Arduino Uno, Arduino Mega 2560, Arduino 101 or any board with the USB female A port of the computer. Cable roughly 178cm. Cable color and shape may vary slightly from image as the stock rotates.



**FIG 8: USB Cable**

### 3.8 SWITCH

A small button or being close that you press up or down in order to boot up electricity. A switch is existent that changes the motion of an electrical circuit. The foremost commonplace kind of switch is something which can be empty of one course and express in an unexpected way. The term switch more often than not implies electrical power.



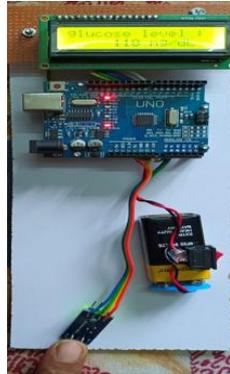
**FIG 9: Switch**

## 4. RESULTS AND DISCUSSION

The study state, which lasted ten weeks, revealed that a diabetes sufferer might look for offer assistance inside 5-15 seconds on normal utilizing any of the sensor modalities. According to the data analysis, the display monitor drew more attention to the diabetes patient and gave quick to begin with help, whereas restorative specialists were exhorted of the same by prescriptions. The device emits a correct display values to the neighboring units that have been designated as emergency contacts, increasing their chances of receiving assistance. A few occurrences of dreadful diabetes effect in heart infection or stroke additionally diabetes is the preeminent cause of kidney disease. These are extreme situations that would account for a small percentage of the overall community's diabetic population. Besides, for such patients, we can have the framework introduced on the bed so that the patient does not ought to walk to the wall.

FIG 10: Measurement of blood glucose level using two different devices

SAMPLE 1



SAMPLE 2



OUTPUT:



FIG 10: Final setup of the project

### 5. CONCLUSION AND FUTURE SCOPES

Future studies will combine more physical parameters (pH, temperature, humidity, frequency, etc.) with other biomarkers related to blood glucose to modify the measurement results for non-invasive skin glucose

Measurement accuracy and blood glucose. To achieve levels, and continuous monitoring of patients with hyperglycaemia and hypoglycaemia, this may be the more general and viable direction of the solution. We planned to work on the security and privacy analysis of the IOMT enabled IGLU device as well as security and privacy of the confidential health data.

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